

## Engineer the PROCESS !!

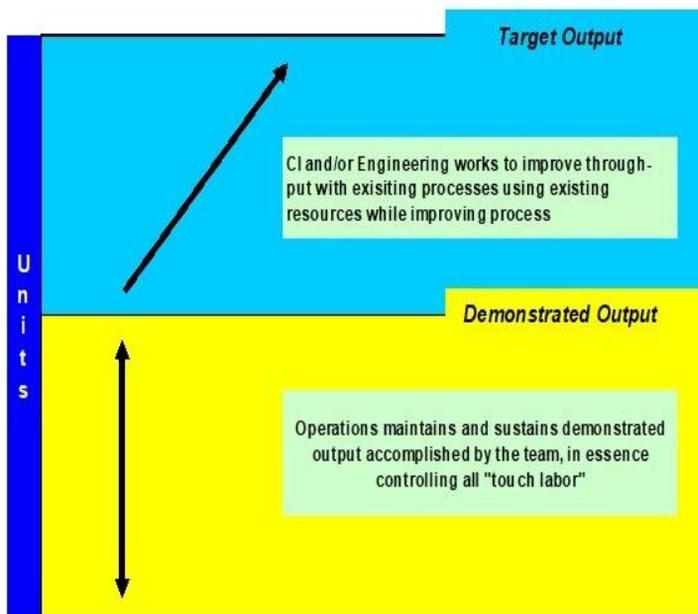
We get so tired trying to retrain organizations that do not understand Takt Time. Takt Time is the rate of which your customer expects to receive your product or service ... so if you design your process to support Takt Time you will always be in a back-order situation. You need to calculate your Total Production Lead Time, this is done by taking the Takt Time and adding your typical losses like breaks and PFD (Personal, Fatigue and Delays). Try not to add in additional capacity since this is just adding waste to your process.

Let us further look at how to study a process ....

Gemba Walks have come in vogue to spur leaders to go where the action happens and observe process ... which is actually a good starting tactic ... but is not enough. We are huge proponent of actually going to the Gemba and standing in an imaginary circle and rally observe a process while taking lots of notes and we do not mean standing there for a couple of minutes and moving on ... but to really stand and observe for at least 30 minutes ... you can read more about standing in the circle here ....

<https://kunstofsolutions.com/blog/stand-circle/>

Sometimes you need to go beyond observation and really study the numbers. Most processes track production outputs. My common approach is to grab production documents for at least the last 3 months and begin to plot the numbers on a graph ... why 3 months? Because you need a minimum of 30 data points to establish a trend. Typically after I graph the numbers this what I see ...



Indeed Demonstrated Output is typically 50% of desired or Target output.

*"Unless you try to do something beyond what you have already mastered, you will never grow."*

*Ronald. E. Osborn*

**Where Lean Thoughts can become Reality**

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It is also important to understand the roles within the organization need to own within the chart. Operations needs to consistently process the output shown by Demonstrated Output ... while Engineering is not off the hook until Target Output has been reached and demonstrated.

The Target Output is usually what was envisioned by the Engineer who designed the process and then became the standard for costing and usually twice the rate of Demonstrated Output. Demonstrated Output includes all of the noise and Disturbances To Flow that have impacted the process. But since it has been Demonstrated this what we can hold the teams to consistently achieve.

### And how to analyse process using Mean, Median, Mode, and Range

When people analyse data the typical approach is to calculate averages ... doing this will get you into potential problems and will not reveal if your process is actually in control. You need to analyze your data in Mean, Median, Mode and Range ... if the process is under control your Mean, Median and Mode should be very close and your Range is at a minimum.

To help with the calculations follow this example ...

Mean, median, and mode are three kinds of "averages". There are many "averages" in statistics, but these are, I think, the three most common, and are certainly the three you are most likely to encounter in your pre-statistics courses, if the topic comes up at all.

The "mean" is the "average" you're used to, where you add up all the numbers and then divide by the number of numbers. The "median" is the "middle" value in the list of numbers. To find the median, your numbers have to be listed in numerical order from smallest to largest, so you may have to rewrite your list before you can find the median. The "mode" is the value that occurs most often. If no number in the list is repeated, then there is no mode for the list.

The mean is the usual average, so I'll add and then divide:

$$(13 + 18 + 13 + 14 + 13 + 16 + 14 + 21 + 13) \div 9 = 15$$

Note that the mean, in this case, isn't a value from the original list. This is a common result. You should not assume that your mean will be one of your original numbers.

The median is the middle value, so first I'll have to rewrite the list in numerical order:

13, 13, 13, 13, 14, 14, 16, 18, 21

There are nine numbers in the list, so the middle one will be the  $(9 + 1) \div 2 = 10 \div 2 = 5$ th number:

13, 13, 13, 13, 14, 14, 16, 18, 21

13, 13, 13, 13, 14, 14, 16, 18, 21

So the median is 14.

The mode is the number that is repeated more often than any other, so 13 is the mode.

The largest value in the list is 21, and the smallest is 13, so the range is  $21 - 13 = 8$ .

mean: 15

median: 14

mode: 13

range: 8

Hope this helps you to better analyze your data.